Space Weather Forecast

Issued on Tuesday, 28 February 2023 at 01:23 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: G1/G2 Minor to Moderate storms possible day 1 (28th), with the recent coronal mass ejection arrival influence easing. Chance of Moderate flares, with slight chance of Strong flares.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Low with only common class flares observed. The largest of these is from a large sunspot region in the northwest disc that has been slowly increasing in size. This has some notable magnetic complexity, but has remained relatively stable despite this. The other regions are all smaller and simpler, and either stable or showing signs of decay. There are signs of a new, potentially active, sunspot region rotating onto the northeast limb. No Earth-directed coronal mass ejections (CMEs) have been observed.

Solar Wind / Geomagnetic Activity: Solar winds have been strongly enhanced due to a couple of CME arrivals. The first from 24 Feb, arrived the evening before this period, but continued to influence solar winds at the start with Strong speeds of 600-700 km/s. The second from 25 Feb, arrived late morning on 27th, resulting in speeds climbing further to be Strong to Very Strong at 700-850 km/s. The total magnetic field strength was generally Moderate at 10-15nT, but became Strong for a time with the second CME arrival, before easing back towards weak levels. The north-south component was predominately negative (southward pointed). Geomagnetic activity has been persistently at G1/Minor Storm to G3/Strong Storm levels. Peak global activity occurred at 27/0600-0900 UTC, however visible aurora was reported across central and northern parts of the UK during the evening of the 27th.

Energetic Particles / Solar Radiation: The count rate of energetic particles has been has fallen towards background levels through the last 24 hours, having been enhanced due to the flare activity on the 25 Feb.

Four-Day Space Weather Forecast Summary

Solar Activity: Low or Moderate activity is expected through the next four days with a chance of isolated Moderate flares. This is predominately from the large sunspot region in the northwest, or from any new region rotating onto the visible disc from over the northeast horizon. This region also brings a slight chance of Strong flares.

Solar Wind / Geomagnetic Activity: Ongoing CME influence is expected to only gradually recede on day 1 and 2 (28th and 1st) with no further CME arrivals currently expected. Solar winds will likely ease from their current Strong levels to be slightly elevated by the end of day 2. There is a low chance of a further slight enhancement following later in the period, from the arrival of fast winds from a small northern hemisphere coronal hole. Ongoing G1-G2/Minor to Moderate geomagnetic storming is expected at first, with a slight chance of G3/Strong storms. These easing through day 1 and 2, to become Quiet to Active, with a chance of G1/Minor Storms. Then mainly Quiet with Unsettled intervals day 3 (2nd) onward. There is a slight chance of a further enhancement later day 3 or day 4 (2nd or 3rd) from any connection to the northern coronal hole. This bringing isolated Active intervals.

Energetic Particles / Solar Radiation: The count rate of energetic protons is expected to fall to

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background with only a slight chance of further enhancements. These are most likely to be due to any flares from the large sunspot in the northwest.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	95	30	10	10
Strong	G3	Yes	20	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	60	60	50	50
Very Active	R3 to R5 X	No	20	20	15	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	10	10	10	10
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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